

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Computer Science and Engineering - NOC:Stochastic Approximation: Theory and Applications

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Co-ordinating Institute - IISc Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

- Lecture 1 - Overview of Stochastic Approximation
- Lecture 2 - Estimating the Mean of a Random Variable
- Lecture 3 - Estimating change rates of webpages
- Lecture 4 - An Introduction to Reinforcement Learning
- Lecture 5 - Policy Evaluation in Reinforcement Learning
- Lecture 6 - Probability Spaces - A Measure Theoretic Perspective
- Lecture 7 - Random Variables as Measurable Maps
- Lecture 8 - Expectation of Random Variable as Lebesgue Integration
- Lecture 9 - Conditional Expectation: A Formal Introduction
- Lecture 10 - Properties of Conditional Expectation
- Lecture 11 - Martingales: Definition and Examples
- Lecture 12 - Doob's Uncrossing Lemma
- Lecture 13 - Doob's Forward Convergence Theorem for Supermartingales
- Lecture 14 - L^2 Martingales
- Lecture 15 - Revisiting the Martingale Convergence Theorem via Stopped Processes
- Lecture 16 - Existence and Uniqueness of Solutions to Ordinary Differential Equations
- Lecture 17 - Continuity of ODE Solutions with Respect to Initial Conditions
- Lecture 18 - Asymptotic Behaviour of Solutions to ODEs
- Lecture 19 - Stability of ODEs and Lyapunov Methods
- Lecture 20 - Foundations of Stochastic Approximation - Assumptions and Key Definitions
- Lecture 21 - Almost Sure Convergence of Stochastic Approximation Iterates
- Lecture 22 - Concluding the Convergence Proof: Internal Chain Transitivity, Connectedness, and Invariance
- Lecture 23 - How Stochastic Approximation Iterates Track an ODE: The Key Lemma
- Lecture 24 - Proof of the Key Lemma - Part I
- Lecture 25 - Proof of the Key Lemma - Part II
- Lecture 26 - Extensions, Variants, and Applications of Stochastic Approximation
- Lecture 27 - Convergence Rate for Linear Stochastic Approximation - Part 1
- Lecture 28 - Convergence Rate for Linear Stochastic Approximation - Part 2
- Lecture 29 - Lower Bounds and the Minimax Risk in Estimation

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- Lecture 30 - Stability Requirements in Stochastic Approximation
- Lecture 31 - Almost Sure Boundedness of Iterates: Theorem and Example
- Lecture 32 - Distributed Estimation of the Mean of a Random Vector
- Lecture 33 - Robust Distributed Learning under Adversaries
- Lecture 34 - Motivation for Stochastic Recursive Inclusion in Distributed Mean Estimation
- Lecture 35 - Well-Posedness of Differential Inclusions
- Lecture 36 - Convergence of Distributed Robust Mean Estimation Iterates through the Lens of Differential Inclusions
- Lecture 37 - Almost Sure Convergence via Robbins-Siegmund Theorem - Part 1
- Lecture 38 - Almost Sure Convergence via Robbins-Siegmund Theorem - Part 2
- Lecture 39 - Introduction to Reinforcement Learning and Value Function Approximation
- Lecture 40 - Temporal Difference Algorithm Through the Lens of Stochastic Approximation
- Lecture 41 - How Good Is the TD Solution? Fixed Point Analysis in Linear Approximation
- Lecture 42 - Almost Sure Convergence Analysis of Temporal Difference Learning via the ODE Method
- Lecture 43 - Best Policy Algorithm for Q-Value Functions: A Stochastic Approximation Formulation
- Lecture 44 - Asymptotic Analysis of Q-Learning Algorithm
- Lecture 45 - Asymptotic Behaviour of the Q-Learning Limit ODE - A Switching Systems Perspective
- Lecture 46 - Concluding the Asymptotic Analysis of Q-Learning
- Lecture 47 - Q-Learning with Linear Function Approximation - A Unified Switching Systems Perspective
- Lecture 48 - Q-Learning with Linear Function Approximation under epsilon - Greedy Exploration
- Lecture 49 - Analysis of Limiting Dynamics in Q-Learning with Function Approximation
- Lecture 50 - Review of Probability Theory and Fundamental Inequalities
- Lecture 51 - Review of Stochastic Approximation Concepts